Morphological and conductivity studies of di-ureasil xerogels containing lithium triflate

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Abstract

Sol/gel derived poly(oxyethylene)/siloxane hybrids doped with lithium triflate, $LiCF_3SO_3$, have been investigated. The host hybrid matrix of these materials, designated as di-ureasil and represented by U(600), is composed by a siliceous framework to which polyether chains containing 8.5 oxyethylene repeat units are covalently bonded through urea linkages. Xerogel samples U(600)n $LiCF_3SO_3$ with n (where n is the molar ratio of oxyethylene repeat unit per Li ion) between and 0.1 have been examined. X-ray diffraction and differential scanning calorimetry have provided conclusive evidence that the xerogels analyzed are completely amorphous. The salt-rich material with n=1 exhibits the highest conductivity over the whole range of temperature analyzed (e.g. $4.3x10^{-6}$ and $2.0\ x10^{-4}$ Scm^{-1}, respectively, at 25 and 94ºC).

Keywords: Di-ureasils; Li ; X-ray diffraction; Differential scanning calorimetry; Ionic conductivity

Conclusions

Completely amorphous lithium triflate-based POE/siloxane ormolyte xerogels in which the organic oxyethylene segments are bonded to siloxane regions by urea bridges have been produced by means of the sol-gel method. Various electrolytes with a wide range of guest salt concentration have been characterized. Their attractive conduting, thermal and mechanical properties suggest that further studies of this organic-inorganic hybrid system are worth pursuing.